

Integrated Network of Optimizations for Aircraft Systems, Phase I

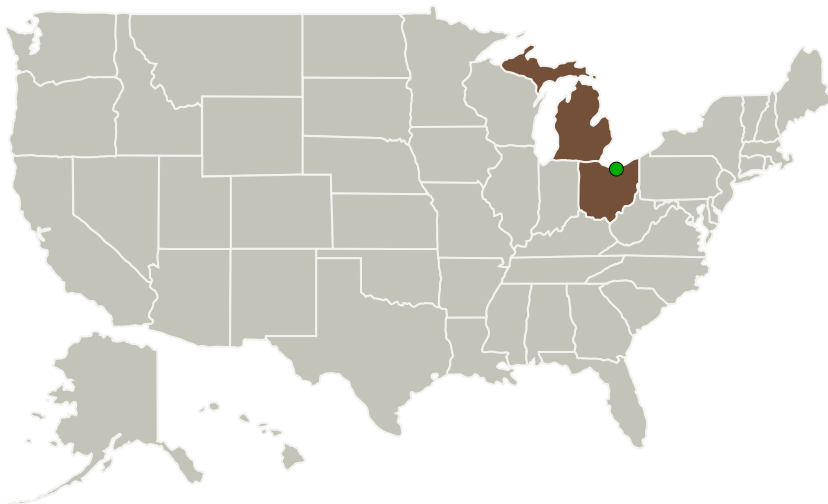
Completed Technology Project (2010 - 2010)



Project Introduction

Aircraft design is a complex process requiring interactions and exchange of information among multiple disciplines such as aerodynamics, strength, fatigue, controls, propulsion, corrosion, maintenance, and manufacturing. A lot of attention has been paid during the past fifteen years in the Multi-disciplinary Design Optimization (MDO) nature of the aircraft design process. However, a consistent void in aircraft design is the ability to integrate high-fidelity computational capabilities from multiple disciplines within an organized MDO environment. Integrating high fidelity simulation technology (that has been developed over the years through significant investments) within a MDO environment will constitute a disruptive technological development in aircraft design. The ability to replace time consuming solvers with metamodels within the highly iterative environment of an integrated network of optimizations is critical for engaging high fidelity simulation tools in the MDO analysis of complex aircraft systems. Previous work completed by the proposing firm has demonstrated the feasibility of conducting such MDO analysis for an aircraft system, while considering outer mold line shape optimization and structural sizing simultaneously. Since the ability to create metamodels from results obtained at a number of sample points from the actual solvers is the key enabling factor for conducting the multi-discipline optimization analysis, the proposed project will use as foundation the existing metamodeling capability of the proposing firm and will pursue new research that will lead to the development of a powerful stand-alone commercial product for metamodel development. The latter, along with the proposing firm's MDO solver will provide the means for operating an integrated network of optimizations for designing aircraft systems.

Primary U.S. Work Locations and Key Partners



Integrated Network of Optimizations for Aircraft Systems, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Integrated Network of Optimizations for Aircraft Systems, Phase I



Completed Technology Project (2010 - 2010)

Organizations Performing Work	Role	Type	Location
Michigan Engineering Services, LLC	Lead Organization	Industry Women-Owned Small Business (WOSB)	Ann Arbor, Michigan
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Michigan	Ohio
----------	------

Project Transitions

▶ **January 2010:** Project Start

✓ **July 2010:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139125>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Michigan Engineering Services, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

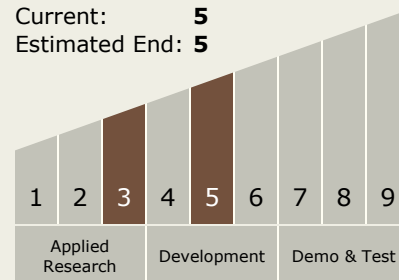
Jim He

Technology Maturity (TRL)

Start: 3

Current: 5

Estimated End: 5



Integrated Network of Optimizations for Aircraft Systems, Phase I

Completed Technology Project (2010 - 2010)



Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.2 Avionics Systems and Subsystems
 - └ TX02.2.2 Aircraft Avionics Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System